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PRESERVATION

with



TENNESSEE EASTMAN CORPORATION
KINGSPORT, TENNESSEE



PRESERVATION

with

NO-D-K

NATURAL WOOD CREOSOTE



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Decay and Termites—Enemies of Wood Construction

PRESENTED on the following pages is a review of the nature and causes of decay and a brief description of termites, which have so destructively invaded the country within the last few years. In addition to this discussion of decay and termites, we have also endeavored to present a plan of treatment which will insure a long and serviceable life to wood, with protection against both of the enemies of wood construction. If you are already acquainted with the facts regarding these two destructive forces, you will readily approve our recommendations as to treatment. We hope that the matter as presented in the following pages will prove instructive and at the same time interesting.

WHAT IS DECAY?—Decay in wood is the breaking down of the cell tissues by action of tiny plants of the fungus type that take their nourishment from the wood as they destroy it. These plants grow from their seeds, just as dandelions or daisies, and as decaying wood is almost everywhere present, so these seeds (or spores as they are called) are everywhere blown about in the air, like tiny bombardments, on every piece of exposed wood, taking root wherever they find suitable places.



Left—

Dry rot fungus (*Poria Incrassata*) which has infected foundation timbers and posts.

Right—

Floor showing dry rot infection which is fruiting abundantly on the surface.

Illustrations courtesy Forest Products Laboratory, Madison, Wisconsin.

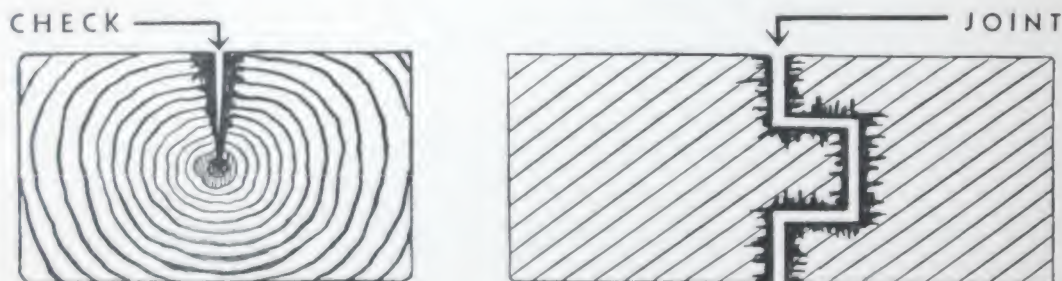




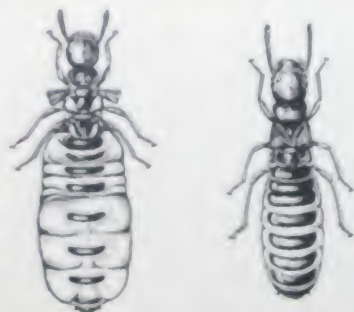
WHAT IS DRY ROT?—Dry rot is another form of decay. Certain types of fungi thrive in dry places, as they have a way of producing from their action on the wood, enough water to sustain them. This type is usually found in poorly ventilated, dark places.

Other fungi need moisture, therefore, grow faster in checks in the wood, or between the surface where two pieces are joined together. As these places usually hold moisture after every rain, and may also collect dust and dirt, they offer the best garden for the tiny plants.

WHERE DOES DECAY START?—Decay must always start at a surface. The term “heart rot” simply means that decay has reached the heart of the tree through a split at the surface and then spread in what is the oldest part of the tree. Please note the illustrations below.

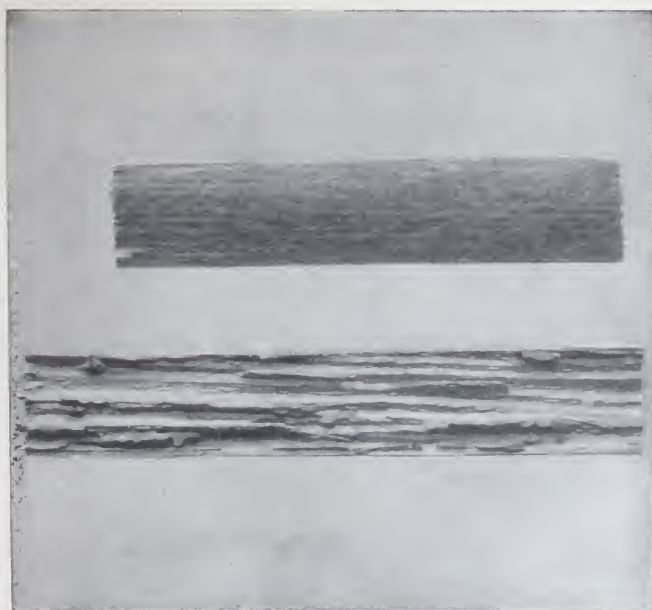


CONCLUSION—If every surface (including the walls of checks, cuttings, etc.) can be kept free from decay, there is little danger of failure of the wood. This point is discussed further under “Methods of Treatment,” page 9.



King and queen of a termite colony.
 Courtesy U. S. Department of Agriculture.

WHAT ARE TERMITES?—Termites, like bees and ants, live in colonies. Their general appearance is so nearly like ants that they are commonly called “white ants.” During a short period in their life cycle, they have wings and are blackish in color and may be very often seen in the



Damage to oak by the common eastern subterranean termite (*Reticulitermes flavipes*). Courtesy U. S. Department of Agriculture.

spring and summer. However, during their life span as workers, they are wingless and not usually observed out of their colony.

Termites shun light and are, therefore, rarely seen. They feed on wood and readily attack lumber and timbers of practically all kinds. To avoid light, they usually devour the entire center of the wood attacked, leaving only a hollow shell. These weakened timbers, of course, cannot support the weight for which they were designed and frequently collapse, causing sagging floors in homes and other

buildings and serious damage to telephone poles, fence posts, bridges, trestles, and other wooden structures. Their menace is so serious that some cities have enacted ordinances that all wooden foundations of buildings, including the subflooring, must be treated with creosote to prevent termite attack.

A NATIONAL MENACE—The popular idea is that termites live only in tropical countries. This is a mistake. There are 44 species which are distributed throughout the country, although, in the Southern, Southwestern, and Pacific Coast regions where both the subterranean and non-subterranean species occur, they are more numerous and injurious than elsewhere.



Winged sexual adults of an eastern subterranean termite colony. Courtesy U. S. Department of Agriculture.



THE REMEDY ALSO A PREVENTIVE—Buildings can be protected from the attack of termites by the use of wood treated with preservatives. Termites can also be eliminated where already established in buildings by removing wood in contact with the ground and replacing it with wood that has been treated. This method is recommended by the United States Government.

CONCLUSION—Therefore, if termites can be prevented and eradicated by treating wood with a suitable preservative, then let us consider the type of wood preserver which will best suit our purpose.

WHAT IS A PRESERVATIVE?—From the conclusions on the prevention of dry rot and the prevention and eradication of termites, we must, therefore, prevent the growth of fungi and also kill termites. Plainly, the surest way is to poison both the fungus plants and the insects. This poisoning is called *toxic* action, and this property varies greatly in different materials that are used as preservatives.

WHAT IS REQUIRED OF A GOOD WOOD PRESERVER?—A wood preserver is of value in proportion to its fulfillment of the following specifications:

1. Powerful toxic (antiseptic) properties.
2. Penetrating when applied to any wood.
3. High boiling, so as not to be driven off by the heat of the sun.
4. Insoluble, so as not to be washed out by water.
5. Non-injurious to workmen handling it.
6. Low enough in cost to be used economically.

One or more of these properties are found in several materials used for wood preserving. The combination of all, necessary for the best results, is found in the product manufactured by the Tennessee Eastman Corporation and marketed under the trade name "NO-D-K."



Our many years of experience and research have resulted in the development of a wood preserver that combines all of the necessary properties. Leading engineers approve the preservation of wood with NO-D-K as summarized in the following pages.

OLD CHARRING METHOD—We all know in the early days the farmer kept his fence posts from rotting by putting the butts into the fire until the surface was charred. Within the wood, just where the fire had stopped, was deposited a layer of creosote (same as NO-D-K) that was formed as the outer layer burned—and we know the long life of these charred posts.



THE MODERN, OR NO-D-K METHOD, is to apply to a small quantity of lumber the creosote obtained from a large number of trees, therefore, the unusual protection which NO-D-K gives is readily apparent and easily understood.

WHAT IS NO-D-K?—NO-D-K is made from true creosote oil obtained by destructive distillation of hardwood. It is sharply distinguished from coal-tar oils, which, because of their great abundance and cheapness, have been extensively used for wood preserving. Coal-tar oils are very toxic (poisonous) to men and animals, as is well known by all who have used them, while against fungi they are not nearly as toxic as is the hardwood oil. The United States Bureau of Plant Industry in cooperation with the United States Forest Products Laboratory, Madison, Wis., has made a study of this question, the results of which are thus stated:

MORE TOXIC THAN COAL TAR—“The toxicity of beechwood creosote, both crude and refined, has been determined and found to be much greater, 2 to 4 times, than that of coal-tar creosote.”

DOES NOT IRRITATE—“They (hardwood creosotes) also have a great advantage



over coal-tar creosote in that they do not inflame the skin and are not toxic or poisonous to humans or animals.”*

POWERFULLY ANTISEPTIC—“The results show that a 0.05 per cent emulsion with the wood tar phenols prevents the growth of the fungus and is about *seven times* as efficient as the coal tar used for comparison. It is because of this high toxic coefficient of the wood-tar phenols and the large proportion present in the hardwood creosote that this oil has such advantage over coal-tar creosote.”

This superiority of NO-D-K has also been demonstrated for years in practical use in all kinds of exposed woodwork. In NO-D-K we use only the portions of hardwood tar most valuable for wood preserving, including the high boiling insoluble guaiacol, creosote, and related phenolic compounds that have such great toxic action against fungi.

GREAT PENETRATION—NO-D-K has a great affinity for wood, following the fibres and there becoming fixed. It is so penetrating that wooden barrels cannot be used for shipping except with great leakage, therefore welded steel drums are used as containers. When applied to any wood NO-D-K enters quickly.

HIGH BOILING—You may have noticed how “creosoted” cross arms drip and wood paving blocks leach in the sun. NO-D-K distills from about 200° C to 300° C and on that account is affected very little by the heat of the sun. NO-D-K, therefore, sets firmly.



HEAVIER THAN WATER—The specific gravity of NO-D-K is approximately 1.100. Thus water is lighter and runs off the treated wood. It is insoluble, therefore, little affected by exposure. This prevents checking, which always hastens decay, as checks are so favorable to germination of fungus spores.

NON-INJURIOUS—NO-D-K is an effective wood preserver which does

*Jour. Ind. & Eng. Chem.



not burn or otherwise injure the skin. You know what this means to men who work with it as well as to others who come in contact.

LOW COST—There is false economy in using an inferior preserver even at a much lower price per gallon. The cost of labor is the same and the replacement cost of the wood when it shall have rotted out is not altered—and compared with these two items the cost of the preservative used is insignificant. Long life of the wood is the vital consideration, so that an inferior article is dear at any price. NO-D-K gives the maximum economy.



Methods of Treatment

There are four general methods of applying a preserver to wood.

BRUSH METHOD—Brushing is the most usual and economical for general work, either old or new. As a rule two coats are put on with a large brush that spreads the oil freely.

IMMERSION—Where large quantities of timber are to be treated on one job, it pays to build a suitable wooden tank lined with tin or galvanized iron in which to dip the wood. The period of immersion varies from 30 minutes to 24 hours, according to the depth of penetration desired. The oil in the tank is heated by a coil laid in the bottom to which steam is usually furnished from the derrick boiler. The penetration of NO-D-K is not accomplished to any great extent during the heated period, as the air in the wood cells is being driven out by expansion. The wood is then removed quickly to a tank of cold oil, or the steam is shut off the coil and the oil allowed to cool over night with the lumber still immersed in it.

This latter method requires considerable time, but accomplishes a deep penetration of NO-D-K to all pores and cells in the outer parts of the lumber. For hard service, such as about dye houses, exposed bridges, and similar places, this long treatment is amply justified by the subsequent saving in replacement expense. Where construction work



is going on simultaneously with the treating, and time is pressing, the two-tank method is recommended.

If the lumber is removed from the hot tank and allowed to cool in the air, all of the NO-D-K on the surface is forced into the wood by the atmospheric pressure, but the penetration will not be as deep.



Treating by immersion in NO-D-K all timbers and plank for roof of dye house at the plant of the Philadelphia Dye Works.

SPRAYING—A still less expensive job is done by spraying, but on account of the thin film the gun must be moved over each part of the surface long enough to deposit the required amount of the preservative. One of the great advantages of spraying is that the creosote reaches all cracks and joints, which is sometimes impossible when the brush method is used. This is particularly the case with structures already erected, where spaces between planks or timbers must be treated. NO-D-K sprayed into such places will kill any fungus that has started, and also help to prevent future infection.

PRESSURE—Impregnation is secured by pumping the oil hot into the timbers enclosed in a large cylinder. This method is expensive but is used for railway ties, etc., which are to be subject to injury from driving spikes frequently, tamping of road ballast, and other rough usage too harsh for surface treatment.



PROGRESSIVE TREATMENT—NO-D-K is effective in all the above methods. We recommend (except for special cases) the brush treatment, two coats freely applied. By “progressive treatment” we mean a further brush coat after three to seven years, according to conditions. By this time, any checks that are going to open will have done so; and any decay that may have started can be arrested.



NO-D-K is applied by either brushing, spraying, or dipping.



The logs of this attractive house have been thoroughly treated with NO-D-K to protect them against decay and the attacks of boring insects, particularly termites.



The Treatment of Mills and Factories

In treating the timbers of mills and factories, the mill engineer encounters unusual conditions of heat and moisture. The deficiency and high cost of resinous Yellow Pine available today for mill construction is overcome by a thorough treatment with NO-D-K, which offers to fungus growth a resistance far greater than that possessed by the best of resinous woods.

One great advantage in the use of NO-D-K is the freedom from drippings from roofs and ceilings, even under the most trying conditions of heat and moisture. The experience of many of the largest manufacturing corporations who have used NO-D-K has proved this statement. Below is an example.

The roof of the dye house of the Philadelphia Dye Works, put on 18 years ago and treated with NO-D-K, gave such good service that in 1922 when their new, large dye plant was built, NO-D-K was again used for treating the lumber. Seven thousand gallons of NO-D-K were used on this job. At the time of this printing the Philadelphia Dye



Works reports that all of the timber treated with NO-D-K looks as good as the day it was put in place and it has already lasted three times as long as untreated wood lasted under similar conditions.

Roof of a section of the Philadelphia Dye Works plant which is boarded solid on the interior and then covered on the exterior with roofing material. The inside of this plant carries intense humidity and dampness which comes in direct contact with the roof boards and trusses, all of which have been treated with NO-D-K.



NO-D-K Solves Six Problems for the Engineer

HIGH GRADE TIMBER is becoming scarce. Low grades of timber are more susceptible to decay, but when properly treated with NO-D-K their useful life approximates that of the best grades.

LOCAL WOODS are frequently inferior, but they can be used economically if treated with NO-D-K, thereby saving greatly on cost.

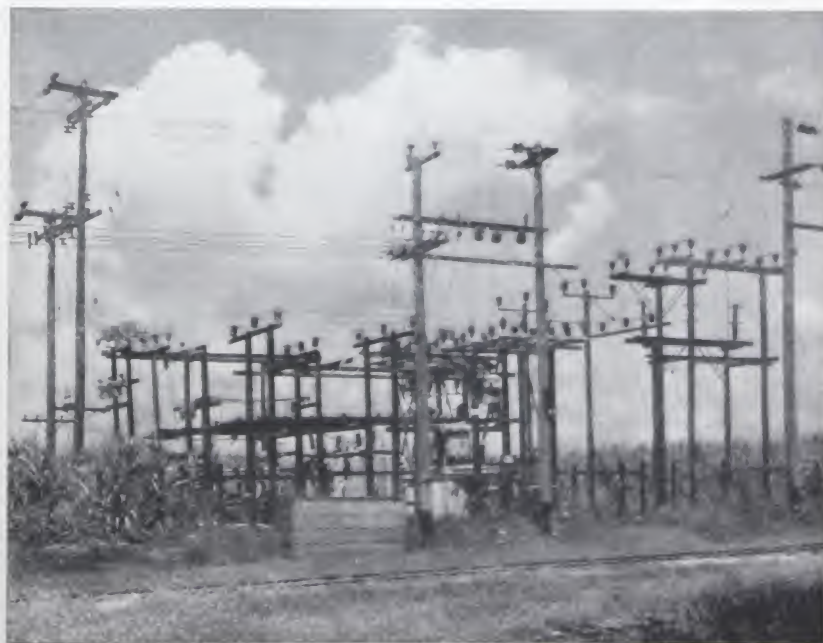
THE USE OF GREEN TIMBER is often compulsory—NO-D-K can be successfully used as a preservative.

PRESERVATION OF WOOD IN ISOLATED PLACES, far removed from creosoting plants, is effected by use of NO-D-K. Take the money that would be spent in impregnating with an inferior oil under pressure, use a small part for a thorough treatment with NO-D-K, place the balance at interest for subsequent re-treatment when necessary.

IN THE TROPICS decay is usually very rapid and is often accelerated by the attack of termites. NO-D-K, in the Philippines, Hawaii, Cuba, and Porto Rico, has proved the best defense against these destructive pests.

PAINT SHOULD BE REPLACED BY NO-D-K on exposed wood. NO-D-K costs less for both material and labor, is more durable and gives far better protection. The creosote is *in* the wood—the paint is *on* it—draw your own conclusions as to BLISTERING — PEELING — CHECKING — WEARING — ROTTING.

Electric power poles of the Hawaiian Electric Company, Honolulu, Hawaii, which have been treated with NO-D-K to protect them from the ravages of the tropical climate. NO-D-K not only protects the poles from decay, but also from attacks of boring insects, such as termites.





Pier at Pearl Harbor, Honolulu, Hawaii, which has been treated with NO-D-K by the U. S. Government to insure a long and serviceable life.



The Pittsburgh Fuel Company uses NO-D-K on their storage bins and reduces expensive repair bills due to decay and dry rot.

Where NO-D-K May Be Used to Advantage

FARMS—NO-D-K finds many uses on farms, being particularly effective when used on barns, outbuildings, fence posts and for disinfection of poultry houses.

COAL MINES AND COAL YARDS—NO-D-K cuts repair bills when used on storage bins, tipples, company houses, mine props, ties, and trestles.

PUBLIC UTILITIES—NO-D-K has been used for years by many public service companies for preserving woodwork in various departments. Poles and cross arms particularly are saved from decay and termite attack by brush coating at vital points.

INDUSTRY—NO-D-K is widely used by industrial concerns for treating loading platforms, sub-flooring, foundation timbers, trestles, and other exposed woodwork.



Coal yards with rough heavy timber used in their construction use NO-D-K not only to protect against decay, but also to improve their appearance.



NO-D-K is well adapted for use on all modern homes. No paint was used on the exposed woodwork of the home above. NO-D-K protects all exterior woodwork.



NO-D-K goes on deck. The Ohio River Transit Company uses NO-D-K to protect the decks of their freighters.



Applying NO-D-K to pile bottoms in the lumber yard increases their durability and reduces replacement cost. NO-D-K also improves their appearance.

CAMPS—NO-D-K is excellent for treating log cabins and rough wooden buildings of all kinds. Its attractive, rich brown color gives a very pleasing effect.

SEAPORTS AND HARBORS—NO-D-K is an ideal material for treating barges, vessel bottoms, posts, pilings, and docks around the waterfront. It is unusually effective against marine borers.

MISCELLANEOUS—Highway bridges, warehouses, frame garages, trestles, and, in fact, all wood subject to the ravages of weather and exposed to attacks from termites, or other boring insects, may be fully protected with NO-D-K. It insures to wood a long and serviceable life.



NO-D-K is excellent for treating trestle construction timbers. Above is a movable gangway of the United Railways of Havana which is treated with NO-D-K.



Poultry raisers use NO-D-K to treat the interior of their poultry houses. NO-D-K kills the parasites and disinfects the roosts.



NO-D-K

A NATURAL WOOD CREOSOTE OIL

SPREADING CAPACITY—One gallon covers 60 to 80 square feet, two coats. In dipping shingles, figure four gallons per thousand.

SHIPMENT—In tank cars, or in welded steel drums containing 50 gallons each. Drums are included in our price and are not returnable.

SHIPPING WEIGHT—In tank cars—nine pounds per gallon. In drums, ten pounds per gallon, gross.

FREIGHT RATE—NO-D-K is shipped on the rate applying to wood preservatives. Your local freight agent can quote you the rates from Kingsport and you can readily figure delivered costs.



Manufactured only by

TENNESSEE EASTMAN CORPORATION

KINGSPORT, TENNESSEE



